

Natural Sciences 102 -- Spring 2004

Homework #5, April 27, 2004

Due in class May 4, 2004

1. An essay question:

The penultimate paragraph of Steven Weinberg's Influential book *The First Three Minutes* contains the statement, "The more the universe seems comprehensible, the more it also seems pointless." In one paragraph, tell me your feelings about this statement.

2. Parallax: (Please show your work.)

- What is annual stellar parallax? What moves, and what appears to move?
- Draw a diagram relating the parallax angle to distances known by other means and distances determined by parallax.
- The annual stellar parallax of the star Wilhite-321 is measured to be 0.02 seconds of arc. What is its distance?

3. Skinny Triangles:

Complete the following table:

Angle in degrees	Angle in radians	Tangent of angle	Sine of angle
1°			
3°			
10°			
30°			
50°			

4. Magnitudes: (Please show your work.)

A new class of dim, dull, not very bright stars has recently been discovered. They are called Bush stars. The quintessential Bush star, W-Bush, has a luminosity of 0.04 times the solar luminosity and is 1 pc distant.

- What is its apparent magnitude of W-Bush?
- What is the annual stellar parallax of W-Bush?

5. Let there be lightbulbs: (Please show your work.)

The luminosity of Arcturus is 10 solar luminosities = 4×10^{28} W and Arcturus is a 0th – magnitude star 10 pc distant.

- How far away (in pc) would a 40 W light bulb be to appear as bright as Arcturus?
- If there are 4×10^{18} cm in a pc, how far away in cm would the light bulb be?

News of the week

- The class website is: <http://home.fnal.gov/~rocky/natsci102/>.
- It would be good if you review your math textbooks about the properties of logarithms.
- This week's laboratory will be the second week of "Temperature of the Universe."
- May's reading assignment is Kolb, Chapters 6-11; Hogan, the entire book.